



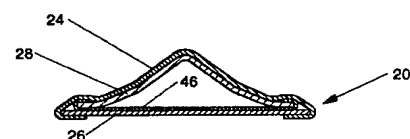
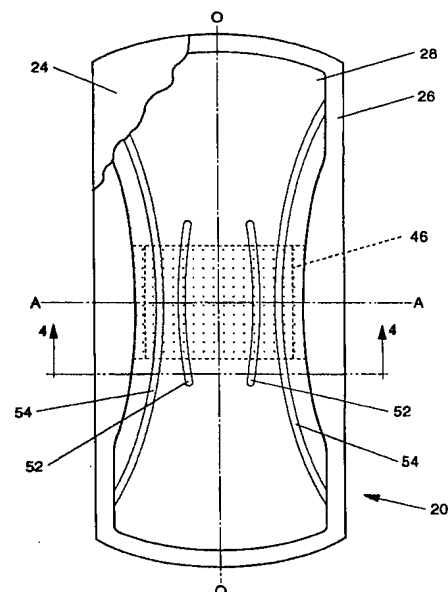
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US94/14296 <b>(22) International Filing Date:</b> 15 December 1994 (15.12.94) <b>(30) Priority Data:</b> 08/171,495                      22 December 1993 (22.12.93)      US <b>(71) Applicant:</b> THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US). <b>(72) Inventor:</b> BERGMAN, Carl, Louis; 6674 Quailrun Court, Loveland, OH 45140 (US). <b>(74) Agents:</b> REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217 (US).		<b>(81) Designated States:</b> AM, AU, BB, BG, BR, BY, CA, CH, CN, CZ, EE, FI, GE, HU, JP, KG, KP, KR, KZ, LK, LR, LT, LV, MD, MG, MN, NO, NZ, PL, RO, RU, SI, SK, TJ, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ).  <b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i>

**(54) Title:** SANITARY NAPKIN HAVING CONVEX UPWARD SHAPED CROSS SECTION

**(57) Abstract**

A sanitary napkin having an elastic member for foreshortening the sanitary napkin in the lateral direction. The elastic member is joined to the absorbent core of the sanitary napkin and acts to provide a convex upwardly shaped cross section. The cross section may be an inverted U-shaped or a W-shaped cross section. The core of the sanitary napkin may be decoupleable from the backsheet.



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## SANITARY NAPKIN HAVING CONVEX UPWARD SHAPED CROSS SECTION

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### FIELD OF THE INVENTION

The present invention relates to sanitary napkins, and more particularly sanitary napkins having a means for providing contact with the labia of the wearer.

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### BACKGROUND OF THE INVENTION

Sanitary napkins are well known in the art. Sanitary napkins intercept menses upon discharge, and thereby protect the clothing and bedding of the wearer from soiling by the menses. However, oftentimes the sanitary napkin can shift during use and the menses will not hit the target area. Additionally, improved menses interception can occur if the sanitary napkin is in close contact with the body of the wearer.

Several attempts have been made in the art to improve body contact with the wearer, and hence absorb menses upon discharge and thereby minimize soiling by providing a sanitary napkin having a convex upward configuration, particularly in cross section. Examples of such attempts are illustrated in U.S. Patents 2,747,575 issued May 29, 1956 to Mercer; 3,343,543 issued September 26, 1967 to Glassman; 5,171,302 issued December 15, 1992 to Buell; and 5,197,959 issued March 30, 1993 to Buell. However, Glassman suffers from drawbacks which are significant in sanitary napkins successfully commercialized today, and further improvements are possible over Buell. The two aforementioned patents issued to Buell are incorporated herein by reference.

Mercer requires the sanitary napkin to have stitching through its thickness to achieve a longitudinal medial hump. Stitching a sanitary napkin according to today's construction is simply infeasible due to the materials now utilized. Also this process is prohibitively slow and costly.

Glassman, in particular, requires the sanitary napkin to have longitudinal troughs on the top surface of the sanitary napkin formed by mechanical compression or cutting slits. This sanitary napkin further has a compression formed continuous groove which may or may not include the moisture resistant covering on the back of the sanitary napkin. The groove allows the sanitary napkin to fold into an inverted U-shape. The longitudinal groove, however, does not promote concave cupping of the front of the sanitary napkin around the

5 mons pubis of the wearer and does not fit into the gluteal groove. More importantly, the continuous longitudinal groove prevents the sanitary napkin from having resiliency. Resiliency is the ability of the sanitary napkin to return to an uncompressed configuration when external deformation forces, such as the lateral pressure of the wearer's thighs, are removed. It is important that the sanitary napkin have resiliency for wearer's comfort, and in  
10 order that the target area remain as large as possible, and menses does not strike the clothing of the wearer. Furthermore, the compressed groove will have a lower rate of absorbency or a lesser capacity.

The Buell patents teach a sanitary napkin having a deformation element with flexure hinges. The deformation element is a moldable substance such as foam and may be  
15 reformable or resilient. The deformation element and hence the sanitary napkin deforms into a W-shaped cross-section in response to lateral pressure from the wearer's thighs. The deformation element, similar to the Mercer stitching, requires an additional component to be added to the sanitary napkin, thus increasing its cost.

In yet another attempt, U.S. Patent 5,007,906 issued April 16, 1991 to Osborn, III et  
20 al. discloses a sanitary napkin having the topsheet and backsheet attached at one transverse edge and unattached at the other transverse edge. The topsheet and core are separable from the backsheet at the unattached edge. Since the backsheet is attached to the wearer's undergarment, and the core is separable from the backsheet, the core is thereby decoupleable from the backsheet and can better move with the wearer.

25 Yet other attempts have been made in the art to impart a convex upward cross section to the sanitary napkin to rely upon various elastic means. For example, U.S. Patent 4,911,701 issued March 27, 1990 to Mavinkurve teaches a sanitary napkin having elastic means disposed across the absorbent element and affixed to the impervious backing layer at opposite points on longitudinally extending sides of the sanitary napkin. The elastic means  
30 may either be inside or outside the backing layer of the napkin. Likewise, U.S. Patent 5,129,893 issued July 14, 1992 to Thoren discloses a sanitary napkin having elastic means applied to the liquid impermeable surface layer. The elastic means is said to impart resiliency to this sanitary napkin to urge the napkin in its applied condition against the outer genitals of the wearer. However, the attempts by Mavinkurve and Thoren suffer from the  
35 drawback that by attaching the elastic to the backsheet, rather than to the core, there is less control over the resulting deformation of the absorbent components of the sanitary napkin and less capability to lift and shape the core and topsheet to the wearer's genitals. Furthermore, attaching the elastic to the backsheet is more likely to cause it to wrinkle, fold, or otherwise detach from the wearer's undergarment. These occurrences either reduce or  
40 displace the target area of the sanitary napkin during wear.

5           Conversely, directly attaching the elastic to the core, in addition to forming a convex upwards configuration, provides the advantages that the absorbent core can be lifted to the genitals of the wearer further from the backsheet, allowing more intimate contact to occur. Additionally, the absorbent core can be more resiliently shaped to match the shape of the genitals, allowing more intimate contact between the core and the genitals, and sustaining  
10       this contact during wear.

          Accordingly, it is an object of this invention to provide a sanitary napkin having a core which, through the topsheet, contacts the labia of the wearer. Additionally, it is an object of this invention to provide a sanitary napkin having a convex upwardly shaped core and topsheet. Finally, it is an object of this invention to provide a sanitary napkin which has  
15       an elastic member attached to the core to provide such convex upwardly shaping.

### SUMMARY OF THE INVENTION

          The invention comprises a sanitary napkin having mutually orthogonal longitudinal and lateral centerlines. The sanitary napkin comprises a liquid pervious topsheet, a liquid  
20       impervious backsheet, and an absorbent core intermediate the topsheet and the backsheet. The absorbent core has alternately disposed longitudinal side edges and transverse end edges, as does the periphery of the sanitary napkin. Joined to the absorbent core is at least one elastic member for foreshortening the sanitary napkin in the lateral direction. The elastic member is joined to the absorbent core and spans the longitudinal centerline. The elastic  
25       member is preferably disposed intermediate the absorbent core and the backsheet. The elastic member laterally foreshortens the sanitary napkin to a convex upward configuration.

          In one embodiment, the sanitary napkin may be provided with lines of weakness symmetrically opposite the longitudinal centerline. Inboard and outboard pairs of lines of weakness are provided. The inboard lines of weakness may be concave towards the  
30       longitudinal centerline, while the outboard lines of weakness may be convex outward from the longitudinal centerline. The elastic member spans the longitudinal centerline and is attached to the core intermediate the lines of weakness on each side of the longitudinal centerline, so that the elastic member laterally foreshortens the sanitary napkin to a W-shaped cross section.

35

### BRIEF DESCRIPTION OF THE DRAWINGS

          Figure 1 is a top plan view of a sanitary napkin according to the present invention, shown partially in cutaway.

          Figure 2 is a vertical sectional view of a convex upwardly shaped cross section of the  
40       sanitary napkin.

5           Figure 3 is an exploded perspective view of a sanitary napkin wherein the elastic member wraps the edges of the core of a sanitary napkin having a W-shaped cross section.

          Figure 4 is a vertical sectional view taken along line 4-4 of Figure 1 and showing a sanitary napkin having a W-shaped cross section.

10          Figure 5 is a top plan view of an alternative embodiment according to the present invention, having a segmented core and plural elastic members.

### DETAILED DESCRIPTION OF THE INVENTION

          As used herein, the term "absorbent article" refers to devices which absorb and  
15   contain body exudates, and, more specifically, refers to devices which are placed against or in proximity to the body of the wearer to absorb and contain the various exudates discharged from the body. The term "disposable" is used herein to describe absorbent articles which are not intended to be laundered or otherwise restored or reused as an absorbent article (i.e., they are intended to be discarded after a single use, and, preferably,  
20   to be recycled, composted or otherwise disposed of in an environmentally compatible manner). A "unitary" absorbent article refers to absorbent articles which are formed of separate parts united together to form a coordinated entity so that they do not require separate manipulative parts like a separate holder and pad. A preferred embodiment of a unitary disposable absorbent article of the present invention is the catamenial pad, sanitary  
25   napkin 20, shown in Figure 1. As used herein, the term "sanitary napkin" refers to an absorbent article which is worn by females adjacent to the pudendal region, generally external to the urogenital region, and which is intended to absorb and contain menstrual fluids and other vaginal discharges from the wearer's body (e.g., blood, menses, and urine). Interlabial devices which reside partially within and partially external of the  
30   wearer's vestibule are also within the scope of this invention. It should be understood, however, that the present invention is also applicable to other feminine hygiene or catamenial pads such as panty liners, or other absorbent articles such as incontinence pads, and the like.

          Figure 1 is a plan view of the sanitary napkin 20 of the present invention in its flat-out state with portions of the structure being cut-away to more clearly show the  
35   construction of the sanitary napkin 20 and with the portion of the sanitary napkin 20 which faces or contacts the wearer, oriented towards the viewer. As shown in Figure 1, the sanitary napkin 20 preferably comprises a liquid pervious topsheet 24, a liquid impervious backsheet 26 joined to the topsheet 24, and absorbent core 28 intermediate the  
40   topsheet 24 and the backsheet 26. The absorbent core 28 has two major faces, a first

5 major face oriented towards the topsheet 24 and a second major face oriented towards the  
backsheet 26. The first major face is on the tension side of the absorbent core 28 when it  
is deformed to a convex upwards configuration as illustrated in Figures 2 and 4.

Convex upwards configurations are inclusive of, but not limited to, W-shapes and  
inverted U-shapes or inverted V-shapes. A W-shaped configuration is generally preferred  
10 due to its longitudinal dams adjacent and inboard of the longitudinal side margins.  
Additionally, in a W-shaped configuration, the cross-sectional dimension of the central  
portion of the sanitary napkin more closely matches the labia of the typical wearer.  
Referring back to Figure 1, plural lines of weakness 52, 54 may be disposed in the core 28  
on the first major face of the core 28. Joined to the core 28 and spanning the longitudinal  
15 centerline O-O is an elastic member 46 which imparts the convex upwards configuration.

The sanitary napkin 20 has two centerlines, a longitudinal centerline O-O and a  
lateral centerline A-A orthogonal thereto. The term "longitudinal" as used herein, refers  
to a line, axis or direction in the plane of the sanitary napkin 20 that is generally aligned  
with (e.g., approximately parallel to) a vertical plane which bisects a standing wearer into  
20 left and right body halves when the sanitary napkin 20 is worn. The term "longitudinally  
oriented" refers to a direction within  $\pm 45$  degrees of the longitudinal direction. The terms  
"transverse" or "lateral" as used herein, are interchangeable, and refer to a line, axis or  
direction which lies within the plane of the sanitary napkin 20 and is generally  
perpendicular to the longitudinal direction. The Z-direction is orthogonal both the  
25 longitudinal and lateral centerlines O-O and A-A of the sanitary napkin 20 and extends  
outwardly from the plane of the sanitary napkin 20, which is defined by the longitudinal  
centerline O-O and lateral centerline A-A.

The long edges of the sanitary napkin 20, which are aligned with the longitudinal  
centerline O-O, are the longitudinal side margins of the sanitary napkin 20. The ends of  
30 the sanitary napkin 20 joining the longitudinal side margins are the transverse ends of the  
sanitary napkin 20. Collectively the longitudinal side margins and transverse ends of the  
sanitary napkin 20 define its periphery. Similarly, the core 28 of the sanitary napkin has a  
periphery defined by alternately disposed longitudinal side margins and transverse ends.

While the topsheet 24, the backsheet 26, and the absorbent core 28 may be  
35 assembled in a variety of well known configurations (including so called "tube" products  
or side flap products), preferred sanitary napkin configurations are described generally in  
U.S. Patent 4,950,264, "Thin, Flexible Sanitary Napkin" issued to Osborn on  
August 21, 1990; U.S. Patent 4,425,130, "Compound Sanitary Napkin" issued to  
DesMarais on January 10, 1984; U.S. Patent 4,321,924, "Bordered Disposable Absorbent  
40 Article" issued to Ahr on March 30, 1982; U.S. Patent 4,589,876, "Shaped Sanitary

5 Napkin With Flaps" issued to Van Tilburg on August 18, 1987. Each of these patents are hereby incorporated herein by reference. Figure 1 shows a preferred embodiment of the sanitary napkin 20 in which the topsheet 24 and the backsheet 26 have length and width dimensions generally larger than those of the absorbent core 28. The topsheet 24 and the backsheet 26 extend beyond the edges of the absorbent core 28 to thereby form not only  
10 portions of the periphery but also side flaps.

The absorbent core 28 may be any absorbent means capable of absorbing or retaining liquids (e.g., menses and/or urine). The absorbent core 28 may be manufactured in a wide variety of sizes and shapes (e.g., rectangular, oval, hourglass, dog bone, asymmetric, etc.) and from a wide variety of liquid-absorbent materials commonly used in  
15 sanitary napkins and other absorbent articles such as comminuted wood pulp which is generally referred to as airfelt. Examples of other suitable absorbent materials include creped cellulose wadding; meltblown polymers including coform; chemically stiffened, modified or cross-linked cellulosic fibers; synthetic fibers such as crimped polyester or polyolefin fibers; peat moss; tissue including tissue wraps and tissue laminates; absorbent  
20 foams; absorbent sponges; superabsorbent polymers; absorbent gelling materials; or any equivalent material or combinations of materials, of mixtures of these. Prophetically, particularly preferred absorbent core 28 is made of thermally bonded air laid material having approximately 15 percent synthetic fibers. Synthetic fibers are preferred due to the ease with which they fuse together to join the core 28 and topsheet 24 as described below.  
25 A particularly suitable synthetic fiber is a bi-component material having a polyethylene sheath and a polypropylene center.

The configuration and construction of the absorbent core 28 may also be varied (e.g., the absorbent core 28 may have varying caliper zones (e.g., profiled so as to be thicker in the center), hydrophilic gradients, superabsorbent gradients, or lower density  
30 and lower average basis weight acquisition zones; or may comprise one or more layers or structures). The total absorbent capacity of the absorbent core 28 should, however, be compatible with the design loading and the intended use of the sanitary napkin 20. Further, the size and absorbent capacity of the absorbent core 28 may be varied to accommodate different uses such as incontinence pads, panty liners, regular sanitary  
35 napkins, or overnight sanitary napkins.

Preferably the absorbent core 28 is made of air laid tissue laminate having a wet tensile strength in the transverse direction of at least 100 grams per centimeter as determined by ASTM Standard D829-49. Such a wet tensile strength is necessary in order for the core 28 to withstand the forces imposed by the elastic member 46 while the  
40 sanitary napkin 20 is in use. In this regard, a core 28 made of an air laid tissue has



5 generally been found to work better than a fluff or airfelt core 28. However, the tensile strength of the core 28 should not be too great, otherwise the sanitary napkin 20 according to the present invention may not have the requisite flexibility. Preferably the sanitary napkin 20 according to the present invention has a flexibility of less than 300 grams, and more preferably, less than 100 grams as measured in accordance with the  
10 aforementioned and incorporated U.S. Patent 4,950,264 issued to Osborn.

The sanitary napkin 20 according to the present invention is preferably decoupleable. In this arrangement and as illustrated by Figure 2, the core 28 is not joined to the backsheet 26, particularly at and near the longitudinal centerline O-O. This arrangement allows the core 28 to separate from the backsheet 26 in the Z-direction in a  
15 process known as "decoupling." Of course, if the core 28 separates from the backsheet 26, it is necessary that the topsheet 24 separate from the core 28 as well. By decoupling the core 28 from the backsheet 26 in the Z-direction, the core 28 can remain in contact with the wearer so that it is more likely to intercept menses upon discharge, while the backsheet 26 moves with the undergarment of the wearer. More preferably, the sanitary  
20 napkin 20 may have longitudinally extending pleats, limiting the amount of Z-direction decoupling of the core 28 and backsheet 26.

A decoupleable sanitary napkin 20 and having such pleats may be made in accordance with commonly assigned U.S. Patent 5,007,906 issued April 16, 1991 to Osborn, III et al., which patent is incorporated herein by reference for the purpose of  
25 showing a preferred construction of a decoupleable sanitary napkin. A particularly preferred decoupleable sanitary napkin 20 according to the present invention has a lateral pleat on the detached rear end of the sanitary napkin 20.

A decoupleable sanitary napkin 20 having an elastic member 46 is particularly preferred because in this execution the core 28 is longitudinally decoupled from and can  
30 longitudinally move relative to the backsheet 26, and hence relative to the wearer's undergarment to which the backsheet 26 is attached. Such decoupling is highly desirable because the backsheet 26 must have a different radius of curvature (as measured in the longitudinal direction) than the core 28 if the backsheet 26 is to remain connected with the undergarment while the core 28 and topsheet 24 are in intimate contact with the body of  
35 the wearer. Longitudinal decoupling of the sanitary napkin 20, in conjunction with Z-direction decoupling suitably accommodates the shear forces caused by this difference in radii of curvature.

Preferably the core 28 is joined to the topsheet 24. Adhesive joining is suitable and commonly used in the art. Joining the core 28 and topsheet 24 ensures these components  
40 will move as an integral unit, so that any menses deposited on the topsheet 24 is more

5 readily absorbed by the core 28.

The backsheet 26 is impervious to liquids and is preferably manufactured from a thin plastic film, although other flexible liquid impervious materials may also be used. As used herein, the term "flexible" refers to materials which are compliant and will readily conform to the general shape and contours of the human body. The backsheet 26 prevents  
10 exudates absorbed and contained in the absorbent core 28 from wetting the clothing and bedding of the wearer. The backsheet 26 may alternatively comprise a film-coated nonwoven material. Preferably, the backsheet 26 is a polyethylene film having a thickness of from about 0.012 mm (0.5 mil) to about 0.051 mm (2.0 mils). Exemplary polyethylene films are manufactured by Clopay Corporation of Cincinnati, Ohio, under the designation  
15 161-0001, and by Tredegar Corporation, of Terre Haute, Indiana, under the designation XP-39385.

The backsheet 26 has an inwardly oriented surface oriented towards the absorbent core 28 and an outwardly oriented surface opposed thereto. The outwardly oriented surface of the backsheet 26 faces, and in use contacts, the undergarment of the wearer. If  
20 desired, strips of adhesive may be joined to the outwardly facing surface of the backsheet 26 to facilitate attachment of the sanitary napkin 20 to the undergarment of the wearer.

Referring back to Figure 1, the topsheet 24 is compliant, soft feeling, and non-irritating to the wearer's skin. Further, the topsheet 24 is liquid pervious permitting liquids (e.g., menses and/or urine) to readily penetrate through its thickness. A suitable topsheet  
25 24 may be manufactured from apertured formed films, foams, or woven and nonwoven materials comprised of natural or synthetic fibers. A preferred topsheet 24 comprises an apertured formed film as described in U.S. Patent 3,929,135, entitled "Absorptive Structures Having Tapered Capillaries," which issued to Thompson on December 30, 1975; U.S. Patent 4,324,246 entitled "Disposable Absorbent Article Having A Stain  
30 Resistant Topsheet," which issued to Mullane, et al. on April 13, 1982; U.S. Patent 4,342,314 entitled "Resilient Plastic Web Exhibiting Fiber-Like Properties," which issued to Radel et al. on August 3, 1982; U.S. Patent 4,463,045 entitled "Macroscopically Expanded Three-Dimensional Plastic Web Exhibiting Non-Glossy Visible Surface and Cloth-Like Tactile Impression," which issued to Ahr et al. on July 31, 1984; and U.S.  
35 Patent 5,006,394 entitled "Multilayer Polymeric Film," which issued to Baird on April 9, 1991. Each of these patents is incorporated herein by reference.

The preferred topsheet 24 for the present invention is the formed film described in one or more of the above patents and marketed by The Procter & Gamble Company of Cincinnati, Ohio as "DRI-WEAVE" for sanitary napkins 20. For the invention described  
40 and claimed herein, it is preferred that the topsheet 24 be synthetic, so that the topsheet 24

5 can be joined to synthetic fibers of the absorbent core 28 by heat. For the embodiments described herein, the topsheet 24 and the core 28 may be joined at continuous or discontinuous lines of weakness 30, 30' using embossing plates having a surface temperature of about 149 to 177 degrees C. The embossing plates may be used to apply pressure to the topsheet 24 and core 28, each having synthetic materials, for about 10  
10 seconds.

The backsheet 26 and the topsheet 24 are positioned adjacent the first and second major faces of the core 28 respectively, so that the core 28 is intermediate the backsheet 26 and topsheet 24. The backsheet 26 and topsheet 24 are preferably joined thereto and to each other by attachment means (not shown) such as are well known in the art.  
15 Adhesives which have been found to be satisfactory attachment means are manufactured by H. B. Fuller Company of St. Paul, Minnesota under the designation HL-1258 or H-2031. The attachment means will preferably comprise an open pattern network of filaments of adhesive as is disclosed in U.S. Patent 4,573,986 entitled "Disposable Waste-Containment Garment," which issued to Minetola et al. on March 4, 1986, and which is  
20 incorporated herein by reference. Alternative attachment means comprise heat, pressure, ultrasonic, and dynamic mechanical bonds.

In an alternative embodiment of the present invention, the sanitary napkin 20 has two flaps (not shown), each of which extend laterally beyond the longitudinal side margins of the sanitary napkin 20. The flaps are configured to drape over the edges of the wearer's undergarment. The flaps help prevent soiling by menstrual fluid, preferably by forming a  
25 double walled barrier along the edges of the undergarment. The flaps are preferably provided with attachment means on the garment surface, so that they can be folded back underneath the crotch of the undergarment. In this way the flaps serve to keep the sanitary napkin 20 properly positioned.

30 The flaps may be constructed of various materials including materials used for the topsheet 24, backsheet 26, combinations thereof, and may be a laminate having tissue in the center. Further, the flaps may be a separate element attached to the main body of the sanitary napkin 20 or can comprise extensions of the topsheet 24 and/or backsheet 26. Preferred flaps may be made in accordance with U.S. Patents 4,589,876 issued  
35 May 20, 1986 to Van Tilburg or 4,687,478 issued August 18, 1987 to Van Tilburg. Both of these patents are incorporated herein by reference.

The elastic member 46 is preferably generally disposed intermediate the core 28 and the backsheet 26, so that the backsheet facing side of the core 28 is contracted and forms a shape concave towards the backsheet 26, thus causing the topsheet facing side of the  
40 core 28 to form a convex shape relative to the topsheet 24 and the genitals of the wearer.

5 The elastic member 46 may be generally parallel the lateral axis A-A, or should at least have a vector component parallel thereto.

The elastic member 46 must have a transverse contractive force sufficient to impart a convex upward cross section to the core 28. Preferably, the elastic member 46 imparts a contractive force sufficient to decouple the core 28 from the backsheet 26. Preferably, the  
10 elastic member 46 is generally longitudinally centered, i.e., disposed near the lateral centerline A-A so that the contractive force is relatively evenly distributed towards both transverse ends of the core 28.

A suitable elastic member 46 preferably has an elastic extensibility of at least about 50 percent, and is provided in the form of a flat film. Preferably, a flat film elastic member  
15 46 has a width in the longitudinal direction of at least about 10-30 millimeters, in order to avoid imposing an undue stress concentration at a particular location of the absorbent core 28. The elastic film should further have a minimal thickness in the Z-direction, in order to avoid discomfort to the wearer. A suitable elastic member 46 may be made of a heat-shrink type film, such as Extra-flex PGO-423 available from the Exxon Company of  
20 Houston, Texas. Such a film, having a width in the longitudinal direction of about 20 millimeters, and applied at a transverse dimension of about 30 millimeters prior to heat shrinking about 10 to about 25 percent has been found to work well for the embodiments described herein utilizing an air laid tissue core 28.

The elastic member 46 should be sized to provide enough lift of the core 28 from  
25 the backsheet 26 to ensure contact of the topsheet 24 with the labia of the wearer. However, the elastic member 46 should not provide too much lift, otherwise the sanitary napkin 20 will be uncomfortable to the wearer. In a preferred embodiment the convex shape of the sanitary napkin 20 will flatten to a generally planar configuration under a pressure of about 0.2 to about 0.3 pounds per square inch.

30 The elastic member 46 may be joined to the core 28 by autogenous bonding, as described in commonly assigned U.S. Patent 4,854,984 issued August 8, 1989 to Ball et al. and incorporated herein by reference. Alternatively, the elastic member 46 may be joined to the core 28 by ultrasonic bonding at discretely spaced bond sites or by using adhesive, as is well known in the art. A suitable adhesive is double-sticky tape available  
35 from Anchor Continental, 3 Sigma Division of Covington, Ohio. Ultrasonic bonding and adhesive bonding are generally preferred to attach the elastic member 46 to the absorbent core 28. This preference results from the localized strengthening which occurs due to the sites of attachments of the ends of the elastic member 46.

Referring to Figure 3, the ends of the elastic member 46 may wrap the edges of the  
40 core 28 to provide better attachment. This arrangement does provide the disadvantage,

5 however, of unduly stiffening the edge of the absorbent core 28. Another disadvantage with this arrangement is that a sanitary napkin 20 having a core 28 with a W-shaped cross section does not occur.

Referring back to Figure 1, if desired, the sanitary napkin may be provided with lines of weakness 52, 54. The lines of weakness 52, 54 may be formed by embossing the core  
10 28 and may optimally further be embossed through the topsheet 24. This arrangement provides lines of weakness 52, 54 in the topsheet 24 registered with the lines of weakness 52, 54 in the core 28.

The lines of weakness 52, 54 are helpful in achieving, but are not the only way necessarily to achieve, a sanitary napkin having a W-shaped cross section. The lines of  
15 weakness 52, 54 are preferably symmetrically disposed about the longitudinal axis. The two inboard lines of weakness 52 are preferably concave towards the longitudinal centerline O-O. The two outboard lines of weakness 54 are preferably convex outward from the longitudinal centerline O-O. This arrangement allows the sanitary napkin 20 to preferentially deform, in response to lateral pressure from the thighs of the wearer and the  
20 contractive force imparted by the elastic member 46 to the W-shaped cross section of Figure 4.

In this arrangement, the ends of, or at least the outboard attachment points of the elastic member 46, are joined to the core 28 intermediate the lines of weakness 52, 54. This arrangement provides the advantage that a W-shaped configuration is formed by the  
25 forces on the bases of the W-shape.

Referring to Figure 5, if desired the core 28 may be divided into plural independent segments 28', 28'', 28''', and 28''''. The segments 28', 28'', 28''', and 28'''' are slightly spaced apart in the longitudinal direction. Adjacent segments 28', 28'', 28''', and 28'''' may be separated (as shown) or joined by an isthmus connection (not shown). One, a plurality of,  
30 or each of the segments 28', 28'', 28''', and 28'''' of the core 28 may be provided with the elastic member 46. This arrangement provides the advantage that each segment 28', 28'', 28''', and 28'''' may be tailored to fit different portions of the wearer's body.

One way in which tailoring the fit of the sanitary napkin 20 to the different portions of the wearer's body may be accomplished is by having the elastic member 46 associated  
35 with each segment 28', 28'', 28''', or 28'''' of the core 28 apply different contractive forces to its respective segment 28', 28'', 28''', or 28'''. One way in which the elastic member 46 associated with each segment 28', 28'', 28''', or 28'''' of the core 28 may apply different contractive forces to its respective segment 28', 28'', 28''', or 28'''' is to be shorter in the transverse direction as the segments 28', 28'', 28''', and 28'''' are disposed towards the rear  
40 of the sanitary napkin 20.

5 For example, and with continuing reference to Figure 5, the sanitary napkin may be provided with four independent segments 28', 28", 28"', and 28"". The segment 28' closest to the front transverse edge of the sanitary napkin 20 need not be provided with an elastic member 46, in order that this segment 28' may have a concave upward shape when worn. This front segment 28' contacts the pubic mound of the wearer during use.

10 The second segment 28", i.e., the inboard segment 28" closer to the front transverse edge during use has an elastic member 46, and a convex upward cross section in order to contact the labial tissue of the wearer during use. An elastic member 46 having a transverse dimension of about 30 millimeters prior to heat shrinking about 20 percent in the transverse direction, and a longitudinal width of about 15 millimeters has been found  
15 to work well in this segment 28" for the embodiments described herein.

The third segment 28"', i.e., the inboard segment 28"' closer to the rear transverse edge is also provided with an elastic member 46. This portion of the sanitary napkin contacts the perianal section of the wearer between the perineum and the coccyx. An elastic member 46 having a transverse dimension of about 25 millimeters prior to shrinking  
20 about 20 percent in the transverse direction, and a longitudinal width of about 15 millimeters has been found to work well in this segment 28"' for the embodiments described herein.

The fourth and rearwardmost segment 28"" of the sanitary napkin is also provided with an elastic member 46 in order to provide maximum decoupling and a convex upward  
25 configuration. This segment 28"" of the sanitary napkin contacts the gluteal groove of the wearer. An elastic member 46 having a transverse dimension of about 20 millimeters prior to heat shrinking about 20 percent in the transverse direction, and a longitudinal width of about 15 millimeters has been found to work well in this segment 28"" for the embodiments described herein.

30 Of course, the segments 28', 28", 28"' and 28"" may be provided with longitudinally oriented lines of weakness 52, 54. Each segment 28', 28", 28"' and 28"" may have lines of weakness 52, 54 which are wholly contained by that segment 28', 28", 28"' or 28"", such as the inboard lines of weakness 52, or which bridge to adjacent segments 28', 28", 28"' and 28"", such as the outboard lines of weakness 54.

35 A segmented sanitary napkin 20 is particularly preferably if it is also decoupleable. While the segments 28', 28", 28"' and 28"" may be decoupled from the backsheet 26 in the Z-direction, more intimate contact with the genitals of the wearer may be obtained if the segments 28', 28", 28"' and 28"" are also longitudinally decoupleable. This arrangement may be achieved by independently attaching each segment 28', 28", 28"' or 28"" to the  
40 topsheet 24, so that each segment 28', 28", 28"' or 28"" can longitudinally move

5 independently of the other segments 28', 28", 28''' or 28'''.

Of course, many variations of the claimed invention are feasible. For example, the elastic member 46 need not extend entirely from one transverse edge of the core 28 to the other. The elastic member 46 may merely span a portion of the lateral dimension of the core 28 so long as it imparts a contractive force thereto. Additionally, a segmented core  
10 28 may be utilized having different attachment points for the plural elastic members. One elastic member 46 may span the entire lateral dimension of the core 28, while other elastic member(s) span only a portion of the core 28. Certain segments 28', 28", 28''', or 28''' may have a W-shaped cross section, other segments 28', 28", 28''', or 28''' have an inverted U-shape, and still other segments 28', 28", 28''', or 28''' have a concave upwards  
15 configuration.

It is to be recognized all such variations are within the scope of the claimed invention.

20

**WHAT IS CLAIMED IS:**

1. A sanitary napkin having a longitudinal centerline and a lateral centerline orthogonal thereto and defining longitudinal and lateral directions respectively, said sanitary napkin comprising:  
a liquid pervious topsheet;  
a liquid impervious backsheet at least partially peripherally joined to said topsheet;  
an absorbent core intermediate said topsheet and said backsheet; and  
at least one elastic member laterally foreshortening said sanitary napkin; said elastic member being joined to said absorbent core at attachment positions disposed on opposite sides of said longitudinal centerline and extending laterally thereacross so that said elastic member spans said longitudinal centerline, whereby said elastic member laterally foreshortens said sanitary napkin to provide a convex upwardly shaped configuration.
2. A sanitary napkin having a longitudinal centerline and a lateral centerline orthogonal thereto and defining longitudinal and lateral directions respectively, said sanitary napkin comprising:  
a liquid pervious topsheet;  
a liquid impervious backsheet at least partially peripherally joined to said topsheet;  
an absorbent core intermediate said topsheet and said backsheet, said core having longitudinally oriented lines of weakness therein, at least two said longitudinally oriented lines of weakness being disposed on each side of said longitudinal centerline; and  
an elastic member for laterally foreshortening said core of said sanitary napkin, said elastic member being joined to said core at attachment positions intermediate the said two lines of weakness disposed on each side of said longitudinal centerline, whereby said elastic member laterally foreshortens said core of said sanitary napkin to provide a W-shaped cross section, and preferably said lines of weakness comprise a pair of inboard lines of weakness and a pair of outboard lines of weakness, said inboard lines of weakness being disposed between said outboard lines of weakness and said longitudinal centerline, said outboard lines of weakness being symmetrically opposite and oriented convex outwardly from said longitudinal centerline, and more preferably said inboard lines of weakness are symmetrically opposite and oriented concave towards said longitudinal centerline.
3. A sanitary napkin having a longitudinal centerline and a lateral centerline orthogonal thereto and defining longitudinal and lateral directions respectively, said sanitary napkin comprising:  
a liquid pervious topsheet;  
a liquid impervious backsheet at least partially peripherally joined to said topsheet;  
an absorbent core intermediate said topsheet and said backsheet, said core being divided into a plurality of longitudinally spaced independent segments; and



- an elastic member joined to at least one said segment at attachment positions disposed on opposite sides of said longitudinal centerline, whereby said elastic member laterally foreshortens said sanitary napkin to a convex upward configuration, and preferably further comprising a plurality of elastic members, characterized in that each elastic member is joined to a different segment of said core, and more preferably said plural elastic members apply different contractive forces to the respective segment of said core to which said elastic member is joined.
4. A sanitary napkin according to Claims 1, 2 and 3 characterized in that said elastic member is disposed between said core and said backsheet.
  5. A sanitary napkin according to Claims 1, 2, 3 and 4 characterized in that said core is decoupleable from said backsheet in the Z-direction at said longitudinal centerline.
  6. A sanitary napkin according to Claims 4 and 5 characterized in that said core has longitudinal side margins and said elastic member is joined to said core at said longitudinal side margins, and preferably said elastic member wraps said longitudinal side margins of said core.
  7. A sanitary napkin according to Claims 1, 2, 3, 4, 5 and 6 further comprising lines of weakness in said topsheet, and preferably said lines of weakness are registered with said lines of weakness in said core.
  8. A sanitary napkin according to Claim 3 further comprising longitudinally oriented lines of weakness in at least one of said segments.
  9. A sanitary napkin according to Claim 8 further comprising lines of weakness in said topsheet registered with said lines of weakness in said core.

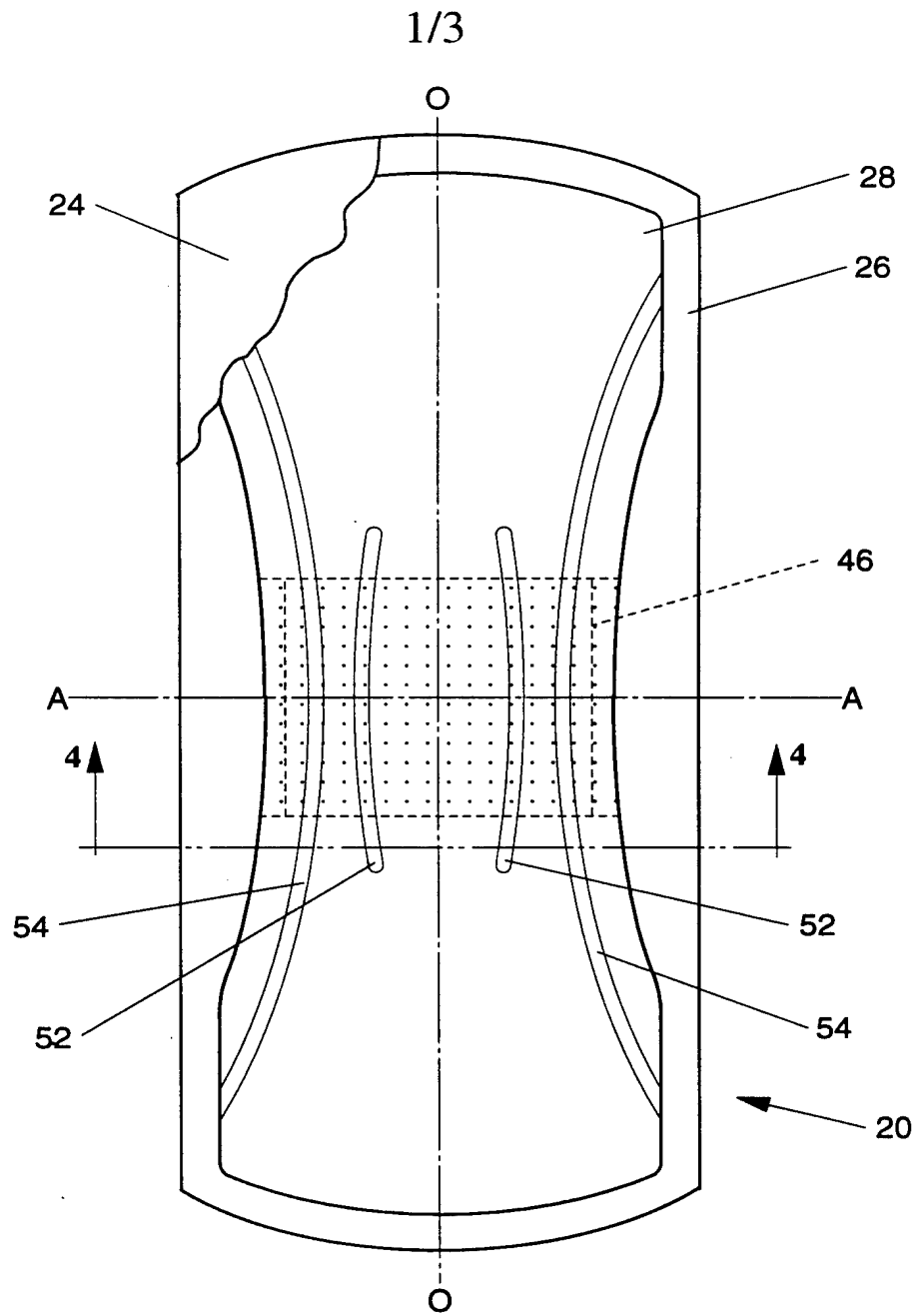


Fig. 1

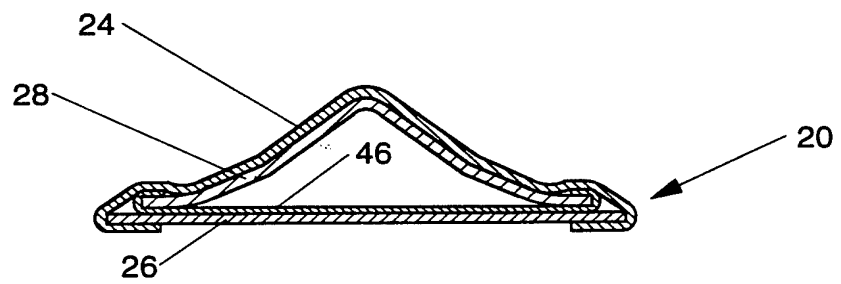
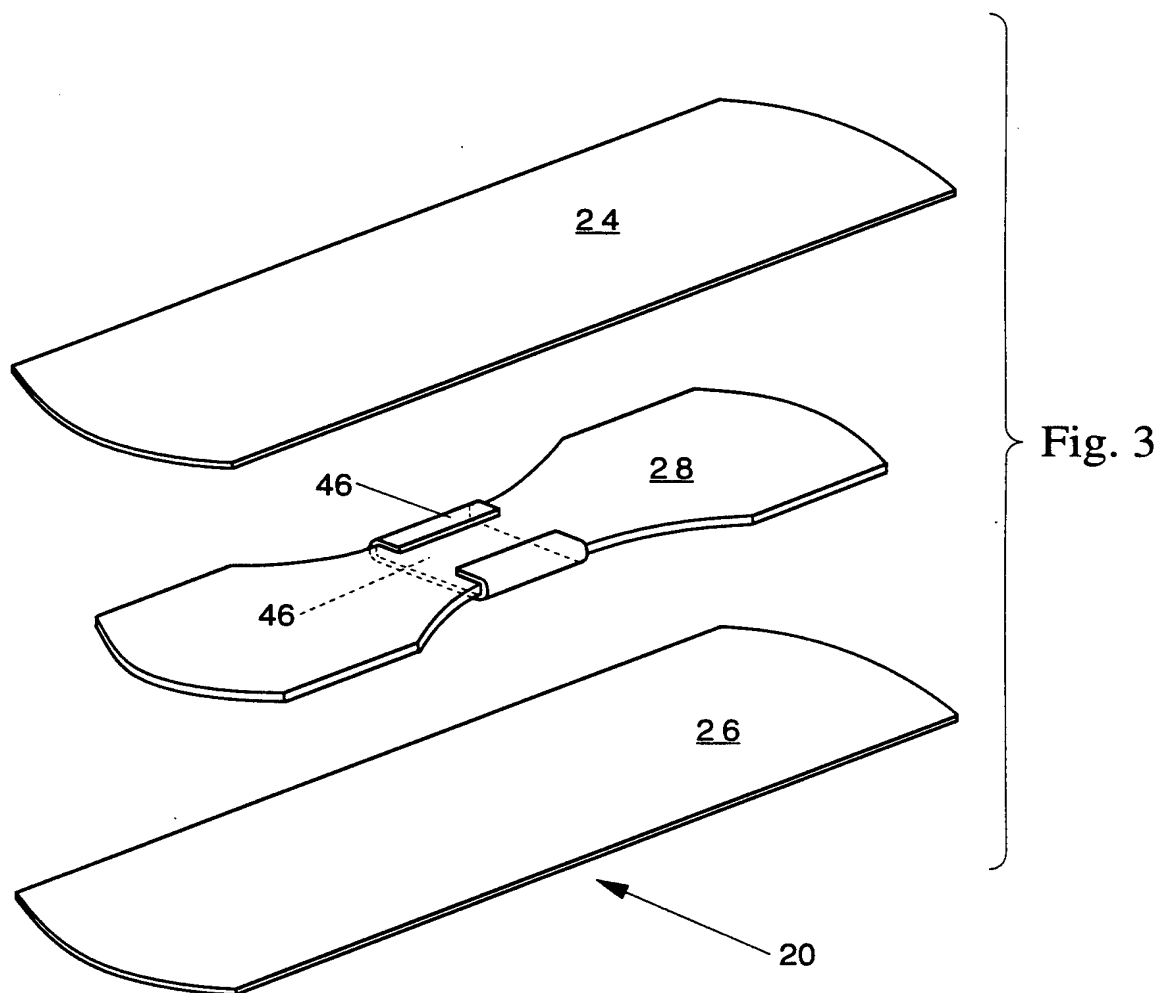


Fig. 2

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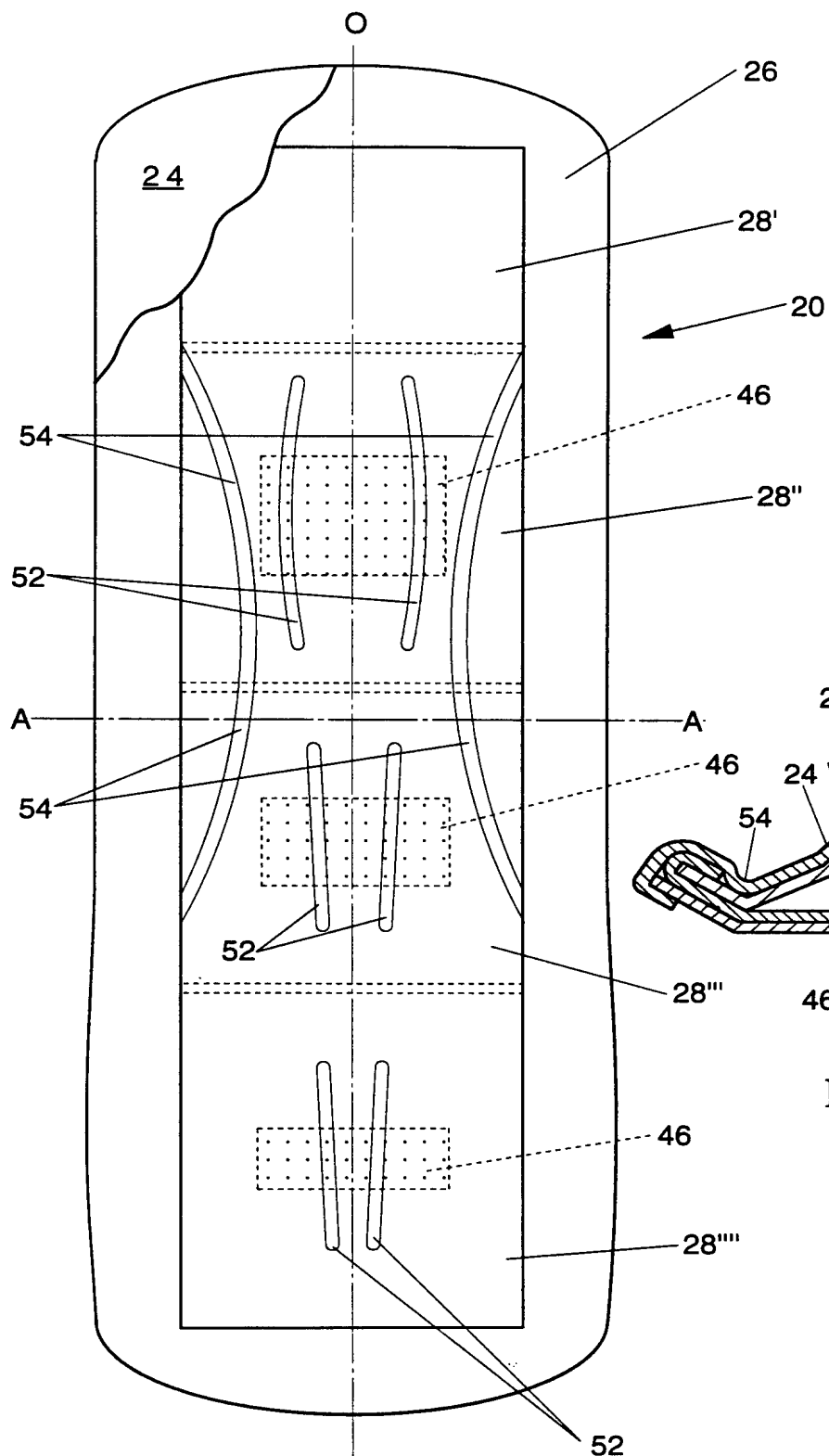


Fig. 5

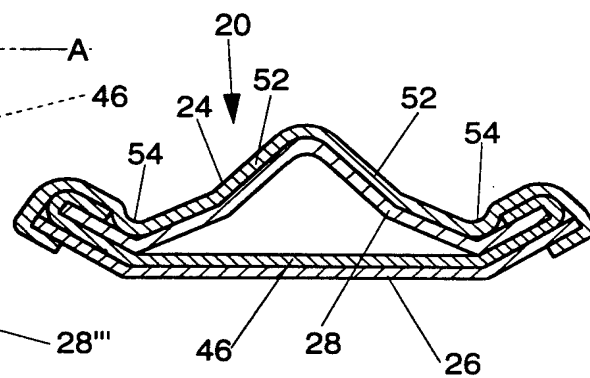


Fig. 4